**Classroom Questioning (abridged)**

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**Introduction**

Articles on the subject of classroom questioning often begin by invoking Socrates. Researchers and other writers concerned with questioning techniques seem to want to remind us that questioning has a long and venerable history as an educational strategy. And indeed, the Socratic method of using questions and answers to challenge assumptions, expose contradictions, and lead to new knowledge and wisdom is an undeniably powerful teaching approach.

In addition to its long history and demonstrated effectiveness, questioning is also of interest to researchers and practitioners because of its widespread use as a contemporary teaching technique. Research indicates that questioning is second only to lecturing in popularity as a teaching method and that classroom teachers spend anywhere from thirty-five to fifty percent of their instructional time conducting questioning sessions.

**The Research on Classroom Questioning**

**Characteristics of the research**

Classroom questioning is an extensively researched topic. The high incidence of questioning as a teaching strategy, and its consequent potential for influencing student learning, have led many investigators to examine relationships between questioning methods and student achievement and behavior.

The findings reported in this summary are drawn from thirty-seven research documents. Twenty-one of these are the reports of experimental or correlational studies, thirteen are reviews, one reports the results of both a review and a study, and two are meta-analyses. . .

**Research findings**

**General Findings**

Some researchers have conducted general investigations of the role of classroom questioning and have drawn the following conclusions:

\* Instruction which includes posing questions during lessons is more effective in producing achievement gains than instruction carried out without questioning students.

\* Students perform better on test items previously asked as recitation questions than on items they have not been exposed to before.

\* Oral questions posed during classroom recitations are more effective in fostering learning than are written questions.

\* Questions which focus student attention on salient elements in the lesson result in better comprehension than questions which do not.

**Placement and Timing of Questions**

\* Asking questions frequently during class discussions is positively related to learning facts.

\* Increasing the frequency of classroom questions does not enhance the learning of more complex material. (Some researchers have found no relationship; others have found a negative relationship.)

\* Posing questions before reading and studying material is effective for students who are older, high ability, and/or known to be interested in the subject matter.

\* Very young children and poor readers tend to focus only on material that will help them answer questions if these are posed before the lesson is presented.

**Cognitive Level of Questions**

Should we be asking questions which require literal recall of text content and only very basic reasoning?

Or ought we to be posing questions which call for speculative, inferential and evaluative thinking? Some researchers have designed experiments which examine the effects of questions framed at differing levels of Bloom's Taxonomy of School Learning. These levels, in ascending order of sophistication, are: (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis, and (6) evaluation. There are other hierarchies, too, which are used as the basis for structuring comparative studies.

The majority of researchers, however, have conducted more simple comparisons: they have looked at the relative effects on student outcomes produced by what they call higher and lower cognitive questions.

Lower cognitive questions are those which ask the student merely to recall verbatim or in his/her own words material previously read or taught by the teacher. Lower cognitive questions are also referred to in the literature as fact, closed, direct, recall, and knowledge questions.

Higher cognitive questions are defined as those which ask the student to mentally manipulate bits of information previously learned to create an answer or to support an answer with logically reasoned evidence. Higher cognitive questions are also called open-ended, interpretive, evaluative, inquiry, inferential, and synthesis questions.

Research on the relationship between the cognitive level of teachers’ questions and the achievement of their students has proved frustrating to many in the field of education, because it has not produced definitive results. Quite a number of research studies have found higher cognitive questions superior to lower ones, many have found the opposite, and still others have found no difference. The same is true of research examining the relationship between the cognitive level of teachers’ questions and the cognitive level of students’ responses. The conventional wisdom that says, “Ask a higher level question, get a higher level answer,” does not seem to hold.

It is only when researchers look at the cognitive level of teachers’ questions in relation to the subject matter, the students, and the teachers’ intent that some meaningful conclusions can be drawn from this body of research. Findings include:

\* On the average, during classroom recitations, approximately 60 percent of the questions asked are lower cognitive questions, 20 percent are higher cognitive questions, and 20 percent are procedural.

\* Higher cognitive questions are not categorically better than lower cognitive questions in elicting higher level responses or in promoting learning gains.

\* Lower cognitive questions are more effective when the teacher’s purpose is to impart factual knowledge and assist students in committing this knowledge to memory.

\* In settings where a high incidence of lower level questions is appropriate, greater frequency of questions is positively related to student achievement.

\* When predominantly lower level questions are used, their level of difficulty should be such that most will elicit correct responses.

\* A combination of higher and lower cognitive questions is superior to exclusive use of one or the other.

\* Students whom teachers perceive as slow or poor learners are asked fewer higher cognitive questions than students perceived as more capable learners.

\* Increasing the use of higher cognitive questions (to considerably above the 20 percent incidence noted in most classes) produces superior learning gains for students above the primary grades and particularly for secondary students.

\* Simply asking higher cognitive questions does not necessarily lead students to produce higher cognitive responses.

\* Teaching students to draw inferences and giving them practice in doing so result in higher cognitive responses and greater learning gains.

\* Increases in the use of higher cognitive questions in recitations does not reduce student performance on lower cognitive questions on tests.

\* For older students, increases in the use of higher cognitive questions (to 50 percent or more) are positively related to increases in:

(1) On-task behavior

(2) Length of student responses

(3) The number of relevant contributions volunteered by students

(4) The number of student-to-student interactions

(5) Student use of complete sentences

(6) Speculative thinking on the part of students

(7) Relevant questions posed by students

\* For older students, increases in the use of higher cognitive questions (to 50 percent or more) are positively related to increased teacher expectations about children’s abilities—particularly the abilities of those students whom teachers have habitually regarded as slow or poor learners.

**Wait-Time**

Researchers on questioning strategies speak of two kinds of wait-time: “wait-time 1” refers to the amount of time the teacher allows to elapse after he/she has posed a question and before a student begins to speak; and “wait-time 2” refers to the amount of time a teacher waits after a student has stopped speaking before saying anything. The research has focused more on wait-time 1 than wait-time 2, but the following findings apply to both.

Because research has established a positive relationship between the amount of instructional content covered and student achievement, researchers and other educators have recommended that teachers keep up brisk instructional pacing. In this way, the reasoning goes, classes will cover more material, student interest will be maintained, and achievement levels will be higher. As with the research on the cognitive level of teachers’ questions, this wisdom turns out to have limited application. Findings include:

\* The average wait-time teachers allow after posing a question is one second or less.

\* Students whom teachers perceive as slow or poor learners are given less wait-time than those teachers view as more capable.

\* For lower cognitive questions, a wait-time of three seconds is most positively related to achievement, with less success resulting from shorter or longer wait-times.

\* There seems to be no wait-time threshold for higher cognitive questions; students seem to become more and more engaged and perform better and better the longer the teacher is willing to wait.

\* Increasing wait-time beyond three seconds is positively related to the following student outcomes:

(1) Improvements in the student achievement

(2) Improvements in student retention, as measured by delayed tests

(3) Increases in the number of higher cognitive responses generated by students

(4) Increases in the length of student responses

(5) Increases in the number of unsolicited responses

(6) Decreases in students’ failure to respond

(7) Increases in the amount and quality of evidence students offer to support their inferences

(8) Increases in contributions by students who do not participate much when wait-time is under three seconds

(9) Expansion of the variety of responses offered by students

(10) Decreases in student interruptions

(11) Increases in student-student interactions

(12) Increases in the number of questions posed by students

\* Increasing wait-time beyond three seconds is positively related to the following teacher outcomes:

(1) in flexibility of teacher responses, with teachers listening more and engaging students in more discussions

(2) Increases in teacher expectations regarding students usually thought of as slow

(3) Expansion of the variety of questions asked by teachers

(4) Increases in the number of higher cognitive questions asked by teachers.

**Relationship between Increasing the Use of Higher Cognitive Questions and Increasing Wait-Time**

The list of benefits produced by increasing higher cognitive questions and the list of benefits resulting from increased wait-time are remarkably similar. In addition, research has shown that the degree of improvement resulting from increases in both higher cognitive questions and wait-time is greater than an increase in either of these variables by itself. Indeed, those who have examined the relationship between these factors tell us that, in a sense, they “cause” one another. That is, the more complex mental operations required by higher cognitive questions call for—and are often found to produce—longer wait-times. And increases in wait-time seem to result in teachers and students carrying out recitations at higher cognitive levels.

**Redirection/Probing/Reinforcement**

The research on questioning includes investigations into the effects of redirecting questions when initial responses are unsatisfactory or incomplete, probing for more complete responses, and providing reinforcement of responses.

These practices have been discussed previously in this School Improvement Research Series. The

1988 “close-up” report entitled Instructional Reinforcement looks at the ways teachers respond to student answers and other student comments, and how the nature of those responses relate to student outcomes. Monitoring Student Learning in the Classroom, also published in 1988, discusses classroom questioning as one of many approaches teachers can use to track student learning. The findings emerging from these investigations are congruent with the general literature on questioning, including:

\* Redirection and probing (often researched together) are positively related to achievement when they are explicitly focused, e.g., on the clarity, accuracy, plausibility, etc. of student responses.

\* Redirection and probing are unrelated to achievement when they are vague or critical, e.g., “That’s not right; try again”; “Where did you get an idea like that? I’m sure Suzanne has thought it through more carefully and can help us.”

\* Acknowledging correct responses as such is positively related to achievement.

\* Praise is positively related to achievement when it is used sparingly, is directly related to the student's response, and is sincere and credible.

**Student Attitudes**

Reports on most practices investigated by educational researchers include findings about the effects of the practice on student attitudes as well as learning outcomes. Research on the relationship between questioning practices and student attitudes is virtually nonexistent. The only findings emerging from the literature reviewed in preparation for this report include:

\* The cognitive level of questions posed is unrelated to students’ attitudes toward the subject matter.

\* Those students who prefer lower cognitive questions perform better in recitations and on tests where lower cognitive questions are posed.

\* Those students who prefer higher cognitive questions perform equally well with higher or lower cognitive questions in recitations and on tests.

**Guidelines for Classroom Questioning**

Based on the foregoing findings from the research on classroom questioning, the following recommendations are offered:

\* Incorporate questioning into classroom teaching/learning practices.

\* Ask questions which focus on the salient elements in the lesson; avoid questioning students about extraneous matters.

\* When teaching students factual material, keep up a brisk instructional pace; frequently posing lower cognitive questions.

\* With older and higher ability students, ask questions before (as well as after) material is read and studied.

\* Question younger and lower ability students only after material has been read and studied.

\* Ask a majority of higher cognitive questions when instructing older and higher ability students.

\* In settings where higher cognitive questions are appropriate, teach students strategies for drawing inferences.

\* Keep wait-time to about three seconds when conducting recitations involving a majority of lower cognitive questions.

\* Increase wait-time beyond three seconds when asking higher cognitive questions.

\* Be particularly careful to allow generous amounts of wait-time to students perceived as lower ability.

\* Use redirection and probing as part of classroom questioning and keep these focused on salient elements of students' responses.

\* Avoid vague or critical responses to student answers during recitations.

\* During recitations, use praise sparingly and make certain it is sincere, credible, and directly connected to the students' responses.

Detailed instructions for teaching students to draw inferences are outside the scope of this paper.

However, the model offered by Pearson (1985) does provide some basic steps which can help students make connections between what they know and what they are seeking to learn. Pearson suggests that teachers complete all the steps in this process by way of demonstration, then gradually shift responsibility for all but the first step to the students.

1. Ask the inference question.

2. Answer it.

3. Find clues in the text to support the inference.

4. Tell how to get from the clues to the answer (i.e., give a line of reasoning).